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The period of γ *Lupi* remains uncertain to the extent of possibly five years, but a longer correction to the above value seems altogether improbable.

Comparison of computed with observed places.

t	θ_0	θ_c	ρ_0	ρ_c	$\theta_0-\theta_c$	$\rho_0-\rho_c$	n	Observers.	Remarks.
	°	°	″	″	°	″			
1836·0	95·3	93·5	0·78	0·78	+1·8	0·00	16–9	Herschel	
1854·1	274·1	273·5	0·83	0·78	+0·6	0·05	5–3	Jacob	
1871·5		273·5		0·58			1	Russell	Not divided.
1877·5	270·±	273·5		0·31	−3·5		1	Russell	Smaller end goes first.
1887·5		93·5		0·03			1	Pollock	Single in 11½ in.
1895·6		93·5		0·32			3	Sellors	Single
1897·1	92·4	93·5	0·34	0·36	−1·1	−0·02	2	See	
1897·1	90·4	93·5	0·47	0·36	−3·1	+0·11	1	Cogshall	
1898·3	93·1	93·5	0·39	0·40	−0·4	−0·01	2	See	
1898·3	93·4	93·5	0·46	0·40	−0·1	+0·06	1	Boothroyd	

The eccentricity of the orbit is quite high, and is comparatively well determined by the great inequality of the motion at the two apses. The value here found will probably not require a correction larger than ±0·05.

In closing I may perhaps observe that this remarkable system and 42 *Comæ* appear to differ from *Algol* variables chiefly in the equal luminosity of both components and the greater periods required for the revolution of their attendants.

Lowell Observatory, Flagstaff, Arizona:
1898 *May* 20.

Note on the Level Errors of the Cape Transit Circle.

By W. H. Finlay, M.A.

In vol. i. Part V. of the *Annals of the Cape Observatory* I discussed the variations of the adjustments of the transit circle from the time of its erection, 1856, up to 1882. The most interesting of these variations were those in level, which were shown to have a well-marked annual period, and which also, there was some reason to believe, were subject to a period of about 18 or 19 years.

As the results of 15 additional years are now available it may be of interest to put on record the behaviour of the level during that time.

In 1894 the error of azimuth had become inconveniently large. On May 16–17 both Ys were moved from their founda-

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tion plates, and the instrument was adjusted in azimuth. Corrections have been applied to the observations taken after this date to allow for the sudden change of level caused by this operation, and similarly in all cases where there was a change arising from mechanical interference with the instrument.

The following table gives the level errors from 1885 to 1897, formed in the same way and reduced to the same system as those given in the *Annals* for 1856–1884.*

Values of Level Error.

		1885.	1886.	1887.	1888.	1889.	1890.	1891.
		″	″	″	″	″	″	″
Jan.	1	−3·88	−3·24	−3·01	−3·34	−2·52	−2·39	−1·96
	15	−3·90	−3·13	−2·93	−3·36	−2·58	−2·43	−2·09
Feb.	1	−3·70	−3·05	−2·98	−3·29	−2·66	−2·49	−2·07
	15	Object-glass being re-polished	−3·01	−3·08	−3·26	−2·71	−2·43	−2·14
Mar.	1		−3·00	−3·14	−3·29	−2·74	−2·43	−2·16
	15		−3·07	−3·18	−3·16	−2·86	−2·48	−2·06
Apr.	1		−3·10	−3·44	−3·29	−3·02	−2·44	−2·10
	15		−3·14	−3·54	−3·37	−3·10	−2·52	−2·10
May	1		−3·21	−3·73	−3·45	−3·02	−2·63	−2·18
	15		−3·42	−3·63	−3·45	−3·11	−2·70	−2·26
June	1		−3·47	−3·77	−3·54	−3·10	−2·74	−2·35
	15		−3·45	−3·72	−3·54	−3·17	−2·72	−2·39
July	1		−3·46	−3·80	−3·66	−3·19	−2·72	−2·53
	15		−3·51	−3·76	−3·63	−3·17	−2·79	−2·44
Aug.	1		−3·51	−3·78	−3·32	−3·19	−2·80	−2·44
	15	−4·08	−3·47	−3·78	−3·22	−3·12	−2·79	−2·47
Sept.	1	−3·94	−3·44	−3·64	−3·18	−2·94	−2·57	−2·36
	15	−3·89	−3·40	−3·48	−2·97	−2·84	−2·38	−2·35
Oct.	1	−3·76	−3·29	−3·39	−2·80	−2·76	−2·36	−2·31
	15	−3·79	−3·30	−3·38	−2·73	−2·74	−2·31	−2·12
Nov.	1	−3·63	−3·26	−3·32	−2·65	−2·51	−2·10	−2·10
	15	−3·52	−3·15	−3·20	−2·50	−2·53	−2·12	−1·91
Dec.	1	−3·42	−3·12	−3·14	−2·52	−2·46	−2·03	−1·86
	15	−3·36	−3·03	−3·27	−2·48	−2·43	−1·97	−1·84
Means		[−3·70]	−3·26	−3·42	−3·16	−2·85	−2·47	−2·19

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* It must be understood that the level errors given here are not the ones used in the ordinary reduction of observations. By occasional adjustment the level error in use has been kept small, but for my purpose corrections have been applied to allow for these adjustments, so as to exhibit the errors as they would have been without alteration from the beginning.

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		1892.	1893.	1894.	1895.	1896.	1897.	1898.	Means.
		″	″	″	″	″	″	″	″
Jan.	1	−1·80	−1·54	−1·49	−1·37	−1·61	−1·73	−2·22	−2·16
	15	−1·76	−1·54	−1·47	−1·40	−1·53	−1·75	−2·18	−2·16
Feb.	1	−1·76	−1·50	−1·40	−1·41	−1·49	−1·77	−2·33	−2·15
	15	−1·75	−1·41	−1·48	−1·35	−1·43	−1·75	−2·28	−2·15
Mar.	1	−1·75	−1·55	−1·47	−1·35	−1·30	−1·80	−2·29	−2·16
	15	−1·76	−1·48	−1·55	−1·31	−1·50	−1·95	−2·35	−2·19
Apr.	1	−1·79	−1·45	−1·69	−1·49	−1·62	−2·04	−2·52	−2·29
	15	−1·88	−1·60	−1·56	−1·61	−1·58	−2·16	−2·71	−2·35
May	1	−1·98	−1·71	−1·56	−1·64	−1·77	−2·19	−2·67	−2·43
	15	−2·10	−1·65	−1·58	−1·76	−1·77	−2·30	−2·77	−2·48
June	1	−2·13	−1·80	−1·99	−1·88	−1·80	−2·39	...	−2·58
	15	−2·21	−1·74	−1·98	−2·01	−1·79	−2·45	...	−2·60
July	1	−2·19	−1·73	−1·99	−1·90	−1·89	−2·46	...	−2·63
	15	−2·28	−1·78	−2·03	−1·99	−1·89	−2·47	...	−2·65
Aug.	1	−2·19	−1·77	−2·12	−1·95	−1·96	−2·51	...	−2·63
	15	−2·09	−1·85	−2·09	−1·91	−1·97	−2·45	...	−2·60
Sept.	1	−1·90	−1·78	−1·91	−1·99	−1·89	−2·50	...	−2·51
	15	−1·90	−1·74	−1·91	−2·01	−1·94	−2·59	...	−2·46
Oct.	1	−1·83	−1·75	−1·81	−1·81	−1·91	−2·57	...	−2·39
	15	−1·99	−1·64	−1·76	−1·79	−1·87	−2·47	...	−2·34
Nov.	1	−1·94	−1·68	−1·69	−1·84	−1·83	−2·45	...	−2·29
	15	−1·92	−1·51	−1·67	−1·71	−1·82	−2·44	...	−2·21
Dec.	1	−1·78	−1·41	−1·49	−1·72	−1·86	−2·39	...	−2·14
	15	−1·77	−1·44	−1·45	−1·61	−1·78	−2·29	...	−2·11
Means		−1·93	−1·61	−1·71	−1·74	−1·73	−2·24		

It is at once obvious from an inspection of the yearly means that for some years after erection there was a rapid sinking of the western pier, which has gradually diminished till at the present time it is almost insensible; so that the assumption (made in my previous paper) of a uniform fall will not fit the later observations.

We might allow for this sinking in various ways, but I shall content myself with assuming that it proceeded in a geometrical progression of which the first term is 0·28 and ratio 0·93.

Correcting the yearly means, then, from the expression $4\ \{1-(0{\cdot}93)^n\}$, where n denotes the number of years from 1856, we obtain the following figures for the variation of level:—

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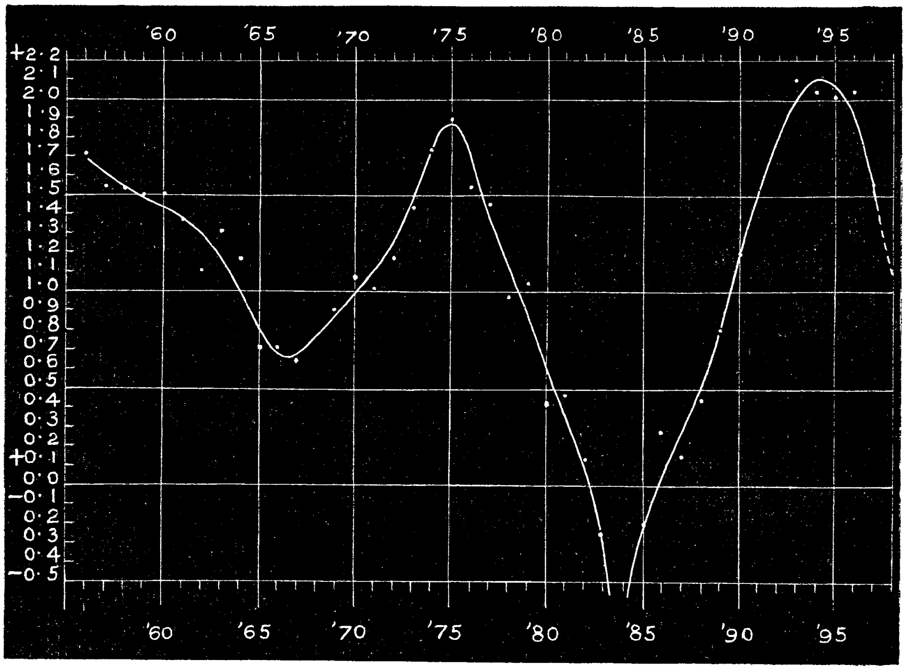
Year.	Level Error.	Year.	Level Error.	Year.	Level Error.	Year.	Level Error.
1856	+1″·71	1867	+0″·66	1878	+0″·98	1889	+0″·79
1857	1·55	1868	0·77	1879	1·05	1890	1·19
1858	1·54	1869	0·91	1880	0·42	1891	1·49
1859	1·50	1870	1·08	1881	0·47	1892	1·77
1860	1·51	1871	1·01	1882	+0·13	1893	2·10
1861	1·37	1872	1·18	1883	−0·24	1894	2·04
1862	1·11	1873	1·44	1884	−0·97	1895	2·02
1863	1·31	1874	1·73	1885	−0·19	1896	2·04
1864	1·18	1875	1·90	1886	+0·29	1897	+1·55
1865	0·73	1876	1·54	1887	0·16		
1866	+0·72	1877	+1·46	1888	+0·44		

The results for the present year, so far as they go, show that the level error will be at least 0·4 smaller than in 1897.



The above values for the level error are represented in the figure, and it is evident that my conjecture of a period of about 19 years is fully borne out.

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Right Ascensions and Declinations of Eight Stars of the Constellation Aquarius; also their probable Proper Motions. By C. J. Merfield.

Introduction.—The following coordinates in right ascension and declination, together with the most probable values of the proper motions, are the result of some inquiry necessary to establish good positions for certain stars of the constellation *Aquarius*, and used by Mr. J. Tebbutt as comparison stars when observing the minor planet (194) *Procne** during the year 1897. As these positions may be useful for other purposes, the writer presents the results to the Society.

The author has to acknowledge especially the kindness shown to him by Mr. H. C. Russell, C.M.G., for granting permission to consult the various star catalogues contained in the Library of the Sydney Observatory. Also his thanks are due to Mr. R. C. Walker, Principal Librarian for the Sydney Public Library, and to Mr. J. Tebbutt, of Windsor, for their kindly assistance.

The methods of Dr. H. S. Davis have been followed, and a *résumé* is given in the following paragraphs :—

Precession.—The year 1875 is the epoch of reduction selected. For this purpose the formulæ of Professor Hill and the constants of Peters and Struve have been adopted. These have been taken from the *Report on the Declinations of Stars employed in Latitude Work with the Zenith Telescope.*

Introducing these constants into the formulæ we have the following :—

$$\frac{d\alpha}{dt} = 3^{s}{\cdot}07225 + [0{\cdot}126115] \sin\alpha \tan\delta + \mu$$

$$\frac{d\delta}{dt} = [1{\cdot}302206] \cos\alpha + \mu'$$

$$\frac{d\mu}{dt} = [5{\cdot}9877-10]\,\mu \cos\alpha \tan\delta + [4{\cdot}8116-10]\,\mu' \sin\alpha \sec^2\delta$$
$$+ [4{\cdot}987-10]\,\mu\mu' \tan\delta$$

$$\frac{d^2\alpha}{dt^2} = [4{\cdot}6338\underset{n}{0}-10] \left(\frac{d\alpha}{dt} - \mu\right) + [5{\cdot}98778-10] \left(\frac{d\alpha}{dt} + \mu\right) \cos\alpha \tan\delta$$
$$+ [4{\cdot}81169-10] \left(\frac{d\delta}{dt} + \mu'\right) \sin\alpha \sec^2\delta$$
$$+ [4{\cdot}9866-10]\,\mu\mu' \tan\delta + 0^{s}{\cdot}000\ 032\ 210$$

$$\frac{d^2\delta}{dt^2} = [4{\cdot}6338\underset{n}{0}-10] \left(\frac{d\delta}{dt} - \mu'\right) + [7{\cdot}1638\underset{n}{7}-10] \left(\frac{d\alpha}{dt} + \mu\right) \sin\alpha$$
$$+ [6{\cdot}736\underset{n}{7}-10]\,\mu^2 \sin 2\delta$$

$$\frac{d^3\delta}{dt^3} = [2{\cdot}0987-10] \left(\frac{d\alpha}{dt} + \frac{\mu}{2}\right) \sin\alpha + [7{\cdot}1638-10] \left(\frac{d^2\alpha}{dt^2} + \frac{d\mu}{dt}\right)$$
$$+ [3{\cdot}025\underset{n}{5}-10] \left(\frac{d\alpha}{dt} + \mu\right) \left(\frac{d\alpha}{dt}\right) \cos$$

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* See *Astronomical Journal*, vol. xviii. No. 420.